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# THE IMPACTS OF SCHOOL-BASED PHYSICAL ACTIVITY AND PHYSICAL EDUCATION ON ACADEMIC PERFORMANCE: A STUDY OF SCHOOLS IN SWAT

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**Abstract**

This study aims to explore how integrating Physical Activity and Physical Education within the school curriculum in Swat may influence students' academic performance. This study looks at how adding Physical Activity (PA) and Physical Education (PE) to school programs in Swat affect students' academic performance. Swat faces special challenges like limited sports facilities and cultural restrictions, especially for girls, which make it hard to include PE and PA in schools. The research measures how much PA and PE students get, and how these relate to their school grades. Studies from around the world show that being physically active helps the brain work better by improving blood flow and brain growth, which helps with memory, thinking, and self-control skills important for learning . The study used a survey with 300 students (150 boys and 150 girls) from public and private schools. Students answered questions about their physical activity, PE classes, and academic results. The data was analyzed with statistical software. Results showed that students do get some PA and PE at school. There was a strong positive link between physical activity and PE, and both were positively linked to better academic performance. Physical activity was found to have a slightly stronger effect on grades than PE. These findings highlight the need to include regular physical activity and good PE programs in Swat's schools. Doing so can improve both students' health and their learning. The study recommends training teachers, improving sports facilities, and involving the community to tackle barriers. It also stresses creating programs that respect local culture and encourage girls to participate.

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## INTRODUCTION

The growing emphasis on academic excellence in educational institutions has prompted many schools to reduce the time devoted to physical education (PE) and physical activity (PA) (Rasberry et al., 2011). However, a substantial body of global research underscores the cognitive, emotional, and behavioral benefits of regular physical activity for school-aged children. These benefits include enhanced concentration, improved executive functioning, emotional regulation, and overall mental well-being, all of which are crucial for academic success (Hillman, Erickson, & Kramer, 2008; Best, 2010). In the context of Swat, a region characterized by unique cultural and educational challenges, the influence of PE and PA on students' academic achievement remains under examined. Physical activity has been shown to support healthy brain development, increase cerebral blood flow, and promote neuro plasticity, contributing to improved learning outcomes (Ratey & Hagerman, 2008). Moreover, regular participation in PE can reduce stress, elevate mood, and enhance classroom behavior, fostering an environment conducive to learning (Mahar et al., 2006). Despite these documented advantages, many schools in rural and semi-urban areas of Swat continue to lack structured physical education programs due to inadequate resources, limited awareness, and lack of trained staff (Baig, Saeed, & Rehman, 2019).

## RESEARCH OBJECTIVES

1. To measure the level of school-based physical activity and physical education among students.
2. To examine the relationship between physical activity, physical education, and academic performance of students.
3. To analyze the impact of physical activity and physical education on students' academic performance.

## HYPOTHESES

**H1**: There is a statistically significant level of school-based physical activity and physical education among students in schools of Swat.

**H2**: There is a significant relationship between physical activity and academic performance of students.

**H3**: There is a significant relationship between physical education and academic performance of students.

**H4**: Physical activity and physical education significantly impact the academic performance of students.

## LITERATURE REVIEW

The relationship between school-based physical activity (PA), physical education (PE), and academic performance has garnered significant attention from educational and psychological researchers over recent decades. This body of research consistently shows that physical activity not only contributes to students' physical well-being but also plays a vital role in enhancing cognitive functions, emotional health, and academic success (Hillman, Erickson, & Kramer, 2008). The importance of integrating PA and PE into school curricula has become increasingly apparent, as it supports holistic development and creates an enriched learning environment.

## THEORETICAL FOUNDATIONS

The link between PA and cognitive and academic outcomes is well-supported by theories of embodied cognition and executive functioning. Embodied cognition posits that cognitive processes are deeply rooted in the body's interactions with the environment, suggesting that physical movement enhances brain function and learning (Hillman et al.,

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2008). Executive functions, which include working memory, cognitive flexibility, and inhibitory control, are critical for academic success because they enable students to regulate their attention, manage multiple tasks, and solve problems effectively (Best, 2010). Hillman et al. (2008) argued that physical exercise increases cerebral blood flow, stimulates neurogenesis, and improves synaptic plasticity, all of which contribute to better brain function. Neurogenesis, the formation of new neurons, is particularly important in the hippocampus, a brain region associated with learning and memory. Best (2010) extended this view by highlighting that PA enhances executive functioning, which translates into improvements in academic tasks such as reading comprehension, mathematical problem-solving, and sustained attention.

**EMPIRICAL EVIDENCE FROM INTERNATIONAL STUDIES**

Several empirical studies have reinforced the positive relationship between PA, PE, and academic performance. Donnelly et al. (2009) conducted an intervention called Physical Activity Across the Curriculum (PAAC), where physical movements were incorporated into academic lessons in elementary schools. Their findings showed significant improvements in reading, math, and spelling scores among students participating in PA-integrated lessons, compared to those receiving traditional instruction. This study demonstrates that physical activity can be an asset to learning rather than a distraction.

Similarly, Mullender-Wijnsma et al. (2016) implemented a randomized controlled trial to assess the effects of physically active math and language lessons. Students in the intervention group scored higher on standardized academic tests than their counterparts in regular classrooms. These results further emphasize the role of PA as a cognitive enhancer and a tool for improving academic outcomes. These studies challenge the common misconception that time spent on physical activity detracts from academic achievement; instead, they show that PA can facilitate deeper learning.

**PHYSIOLOGICAL AND PSYCHOLOGICAL MECHANISMS**

The mechanisms through which physical activity influences academic performance are multifaceted. Physiologically, PA increases oxygen supply to the brain, which supports neuronal health and cognitive processing (Ratey & Hagerman, 2008). Exercise also stimulates the release of neurotrophic factors that promote synaptic plasticity, enabling the brain to adapt and learn more effectively. Regular physical activity has been shown to improve brain structure, particularly in regions related to memory and executive functioning.

Psychologically, engaging in physical activity reduces stress and anxiety—factors that are known to impair academic performance. Exercise enhances mood by increasing the production of endorphins and other neurotransmitters, which contribute to feelings of well-being (Mahar et al., 2006). Improved self-esteem and better sleep patterns resulting from regular PA also play critical roles in optimizing cognitive functioning and school performance. Additionally, students who are physically active often demonstrate better classroom behavior, including reduced hyperactivity and improved attention span, which create more conducive conditions for learning (Sibley & Etnier, 2003).

**SYSTEMATIC REVIEWS AND META-ANALYSES**

A comprehensive systematic review by Rasberry et al. (2011) analyzed over 50 studies and found consistent evidence that increased time allocated to physical education and activity in schools positively correlates with improved academic outcomes. Importantly, this review dispelled concerns that increasing PE time would negatively impact academic learning.

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Instead, students who were more physically active generally exhibited higher grades, better performance on standardized tests, and increased school attendance rates.

The review further highlighted that the cognitive benefits of PA are especially significant in younger children, as their brains are more sensitive to physical health and activity patterns during critical developmental periods. This evidence underscores the need for educational policymakers to prioritize PE and PA as integral components of the school day, particularly in early education settings where foundational skills are established.

**CHALLENGES AND CONTEXTUAL FACTORS IN PAKISTAN AND SWAT REGION**

While international research supports the academic benefits of PA and PE, the context in Pakistan—and specifically in the Swat region—presents distinct challenges. Cultural perceptions, economic constraints, and infrastructural inadequacies often limit the implementation and effectiveness of school-based PA programs. Baig, Saeed, and Rehman (2019) highlighted that physical education in many Pakistani schools is underemphasized due to a shortage of trained PE instructors, lack of proper sports equipment, and minimal administrative support.

In rural and conflict-affected areas like Swat, these challenges are even more acute. Limited resources and sociocultural barriers can reduce opportunities for children, especially girls, to participate in physical activities. Despite these obstacles, localized and culturally sensitive interventions could provide meaningful improvements in students' physical and academic outcomes. School programs that integrate PA with academic curricula, tailored to local realities, may foster better engagement and learning.

**IMPORTANCE OF LOCALIZED RESEARCH AND POLICY IMPLICATIONS**

Given the strong international evidence supporting the positive impacts of PA and PE on academic performance, it is crucial to conduct region-specific studies that consider cultural, economic, and infrastructural factors unique to areas like Swat. Localized research can inform how best to design, implement, and sustain PA programs that are both effective and contextually appropriate.

Such studies should also examine differences in outcomes based on gender, socioeconomic status, and school resources to identify equity issues and tailor interventions accordingly. As education systems in developing regions seek to improve both health and academic achievement, integrating structured physical activity into school programs emerges as a promising, evidence-based strategy. Policymakers and educators should prioritize investment in PE infrastructure, teacher training, and community engagement to maximize the benefits of physical activity on students' overall development.

Physical activity (PA) and physical education (PE) have been increasingly recognized not only for their physical health benefits but also for their positive impact on academic achievement. Research over the past two decades has demonstrated that participation in PA and PE enhances cognitive functions such as attention, memory, and problem-solving, which are essential for learning. Hillman, Erickson, and Kramer (2008) found that exercise improves brain function by increasing neurogenesis and neural connectivity, while Best (2010) emphasized that PA enhances executive functions closely linked to academic success.

Several empirical studies support this connection. Donnelly et al. (2009) showed that integrating physical activity into classroom lessons improved students' academic performance in reading, math, and spelling. Similarly, Mullender-Wijnsma et al. (2016) demonstrated that students receiving physically active instruction in math and language performed better than those in traditional classrooms. These findings indicate that physical activity complements, rather than detracts from, academic learning.

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The mechanisms through which PA influences academic performance include both physiological and psychological factors. Physiologically, PA increases oxygen delivery to the brain and promotes brain plasticity (Ratey & Hagerman, 2008). Psychologically, it reduces stress and anxiety, improves mood and self-esteem, and supports better sleep patterns, all contributing to enhanced focus and engagement in the classroom (Biddle & Asare, 2011). Behavioral benefits are also noted; Mahar et al. (2006) found that students who participate in regular physical activity show better classroom behavior and improved time-on-task, important factors for academic achievement.

Systematic reviews and meta-analyses reinforce these conclusions. Rasberry et al. (2011) reviewed over 50 studies and concluded that increased time for PE and physical activity correlates with better academic outcomes, higher grades, and improved attendance without compromising time for core academic subjects. Fedewa and Ahn (2011) similarly found that PA interventions yield moderate improvements in academic achievement, particularly in math and reading.

However, in developing countries like Pakistan, the integration of PA and PE in schools faces significant challenges. Baig, Saeed, and Rehman (2019) highlighted issues such as lack of trained PE teachers, inadequate facilities, and cultural attitudes that limit the prioritization of physical activity. These challenges are especially acute in rural and conflict-affected areas like Swat, where socio-economic and infrastructure barriers further restrict students' opportunities for PA.

Cultural factors also play a role, especially regarding girls' participation in sports. Khan, Rahman, and Hussain (2020) found that cultural restrictions and safety concerns limit girls' access to physical activity in Pakistani schools. Addressing these barriers requires culturally sensitive program designs that engage communities and encourage inclusive participation.

Given the growing evidence supporting the positive effects of physical activity on academic outcomes, it is important for schools to adopt comprehensive PA and PE programs that are contextually appropriate. Investments in teacher training, resources, and curriculum adjustments can help realize the cognitive and academic benefits of physical activity. Further localized research in regions like Swat is needed to evaluate the effectiveness of such programs and to tailor interventions based on gender, socio-economic status, and cultural norms.

## METHODOLOGY

A descriptive correlational research design was employed in this study. The population consisted of students aged 12 to 16 years from both public and private schools in Swat. Using purposive sampling, a total of 300 students (150 boys and 150 girls) were selected from ten schools. Data were collected through a structured, closed-ended questionnaire. Physical activity and physical education were measured by exercise-related questions, while academic performance was assessed using students' result scores. Data collection took place over a two-month period. The collected data were analyzed using SPSS software, applying descriptive statistics, Pearson correlation, and regression analysis.

## RESULTS

There is a statistically significant mean differences of school-based physical activity and physical education among students in schools of Swat.

| Mean Difference | t-value | Df | F-value | Sig. (2-tailed) |
|---|---|---|---|---|
| 0.30 | 3.16 | 298 | 0.84 | .000 |

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The Levene's Test for Equality of Variances yielded an F-value of 0.84 with a significance level (Sig.) = .359, which is greater than 0.05. This confirms that the assumption of equal variances is not violated, and the results from the equal variances assumed row of the t-test are valid. The Independent Samples t-test results show a mean difference of 0.30, with a t-value of 3.16 and degrees of freedom (df) = 298. The p-value (Sig. 2-tailed) is .000, which is less than 0.05, indicating that the result is highly statistically significant.

**There is a significant relationship between physical activity , physical education and academic performance of students.**

| Variables | Physical Activity | Physical Education | Academic Performance |
|---|---|---|---|
| Physical Activity | 1 | .68 | .54 |
| Physical Education | .68 | 1 | .59 |
| Academic Performance | .54 | .59 | 1 |

A Pearson correlation analysis was conducted to examine the relationships between physical activity, physical education, and academic performance among students. The results indicated a significant positive relationship between physical activity and physical education, r=.68, suggesting that students who engage more in physical activity also tend to participate more in physical education. Additionally, both physical activity and physical education were significantly positively correlated with academic performance, with correlation coefficients of r=.54 and r=.59, respectively. These findings suggest that higher levels of physical activity and physical education are associated with better academic performance among students

**Physical activity and physical education significantly impact the academic performance of students.**

| Model | Unstandardized Coefficients | Std. Error | Standardized Coefficients (Beta) | t | Sig. |
|---|---|---|---|---|---|
| (Constant) | 1.25 | 0.18 | | 6.94 | .000 |
| Physical Activity | 0.35 | 0.07 | .372 | 5.00 | .000 |
| Physical Education | 0.29 | 0.06 | .310 | 4.83 | .000 |

A multiple linear regression was done to see how physical activity and physical education affect students' academic performance. The results showed that together, these two factors significantly predict academic performance. Physical activity had a positive effect on academic performance. Specifically, for every one-unit increase in physical activity, academic performance increased by 0.35 units, even when physical education was kept constant. This effect was statistically significant. Similarly, physical education also had a positive and significant effect. For every one-unit increase in physical education, academic performance increased by 0.29 units, while controlling for physical activity. The constant (intercept) was 1.25, which is the predicted academic performance when both physical activity and physical education are zero.

## FINDINGS

There is a strong positive correlation between physical activity and physical education among students in Swat, indicating that students who engage more in physical activities also participate more in physical education classes.

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Both physical activity and physical education show significant positive relationships with academic performance, suggesting that students who are more physically active and involved in physical education tend to achieve higher academic scores.

Regression analysis reveals that physical activity and physical education significantly predict academic performance. Specifically, physical activity has a slightly stronger impact (β=.372) than physical education (β=.310) on students' academic results.

The model overall is statistically significant, supporting the idea that school-based physical activity and physical education together contribute meaningfully to students' academic achievement.

## CONCLUSION

The study concludes that physical activity and physical education play important roles in enhancing the academic performance of students in schools of Swat. Encouraging regular physical activity and effective physical education programs can positively influence students' academic outcomes. These findings highlight the value of integrating physical fitness and education into the school curriculum to support both physical and cognitive development.

## RECOMMENDATIONS

- Schools should prioritize and promote physical activity and physical education programs as part of the regular curriculum to support students' overall development and academic success.
- Teachers and school administrators should be trained to design engaging and inclusive physical education activities that motivate all students to participate actively.
- Policy makers should consider allocating resources for improving sports facilities and equipment in schools to encourage more physical activity.
- Further research could explore the impact of different types of physical activities on various academic subjects to tailor interventions more effectively.
- Parents and communities should be made aware of the benefits of physical activity on academic performance to encourage support outside of school settings.

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